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USER SATISFACTION AND CHALLENGES IN IT-BASED LIBRARY SERVICES: A STUDY OF AUTONOMOUS ENGINEERING COLLEGES

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ABSTRACT

ICT adoption has reshaped how academic libraries deliver services, widening access to scholarly content and lifting operational efficiency across engineering institutions. In autonomous engineering colleges, IT-enabled resources — digital collections, the Online Public Access Catalogue (OPAC), and remote access platforms — now underpin teaching, learning, and research. Drawing on a descriptive survey with a quantitative design, this study examines user satisfaction and the obstacles encountered when engaging with these services. Structured questionnaires were administered to 345 respondents from 30 autonomous engineering colleges. Most users access IT-based library services daily or several times a week. Digital resources such as e-journals, OPAC, and online databases are used frequently and are broadly viewed as convenient and valuable. Satisfaction is also shaped by staff responsiveness and intuitive software. Despite these strengths, recurring problems persist — most notably poor internet speeds, system instability, a limited digital catalogue, and uneven user competence with digital tools. The findings point to the need for upgraded digital infrastructure, broader user training, and stronger technical support. Sustained investment in service development is required to keep pace with user expectations and maintain service quality. The study offers practical guidance for library practitioners, institutional administrators, and policymakers working to advance IT-based library provision in higher education.

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INTRODUCTION

The rapid expansion of Information and Communication Technology (ICT) has fundamentally changed how academic libraries work — and how users find information. Libraries have moved steadily away from print-only collections toward digital environments that deliver fast, wide access to scholarly resources. In engineering institutions, this shift has redefined the library's role: from a passive document store to an active knowledge hub serving the whole academic community. The change matters most in autonomous engineering colleges, where access to current, high-quality knowledge is a basic requirement for both innovation and effective study. Platforms including OPAC, e-journals, e-books, institutional repositories, and integrated digital library systems are now used daily by students and researchers. These tools do more than speed up information retrieval — they extend access beyond the library's walls, letting users consult resources at any time and from any location. As dependence on these systems grows, user satisfaction has become one of the clearest measures of whether digital library services are actually doing what they are supposed to do.

Growing reliance on IT-based library systems has simultaneously raised user expectations. Library patrons now expect seamless access, intuitive interfaces, and dependable infrastructure. Connection speed, system responsiveness, and ease of navigation each directly affect how productively services are used. Library professionals have had to adapt accordingly — their work now encompasses digital guidance, first-level technical support, and structured help for building information literacy. Yet a range of practical problems continues to undermine smooth service delivery: slow internet connections, periodic system failures, thin digital holdings, and patchy technical competence among users. Differences in institutional infrastructure and user awareness add to these difficulties. Regular assessment and iterative improvement of library systems are, therefore, essential. This study starts from the view that understanding what satisfies users — and what blocks them — is a prerequisite for meaningful improvement. Against this backdrop, the present investigation examines usage patterns, satisfaction levels, and access challenges in IT-based library services across autonomous engineering colleges, with the broader aim of informing practical advances in digital library environments.

REVIEW OF LITERATURE

ICT-driven change in academic libraries has been widely documented, especially in engineering institutions where timely access to digital knowledge resources is foundational. Across this body of work, user satisfaction has consistently served as the central measure of service performance. Praveen and Shivalingaiah (2013) examined library service satisfaction in engineering college settings. Users expressed reasonable contentment with conventional services, but electronic resource provision fell short on both user awareness and accessibility. Their work stressed the need for structured educational interventions so users could make fuller use of digital services. Sampath Kumar and Kumbar (2006) studied how electronic information resources were used in academic settings and found that despite growing availability, actual use stayed limited by inadequate training and weak digital competence. Satisfaction, the study concluded, is tightly tied to how easily users can access resources and how familiar they are with the tools involved. Thanuskodi (2011) investigated ICT-based library service usage and documented a clear preference for online resources, mainly because of convenience and time efficiency. The study also identified structural barriers to effective use, including weak infrastructure, slow internet, and insufficient guidance from library staff. Madhusudhan (2010) explored electronic resource usage among research scholars and found that while users were generally satisfied with available e-journals and databases, problems persisted in executing efficient searches due to poor search skill development. Structured orientation programmes were recommended as a remedy. Kaushik (2013) assessed user satisfaction with digital library services and noted that appreciation for services was offset by practical concerns — restricted access points, outdated systems, and absent technical support all harmed the user experience. Improving both infrastructure and technical assistance was recommended. Singh and Verma (2014) showed that satisfaction in engineering college libraries is shaped by a cluster of related factors: resource availability, service quality, and staff support each play a distinct part. Awareness campaigns and ongoing training were found especially effective in expanding uptake of IT-based services. Taken together, the reviewed literature shows that IT-based library services have meaningfully extended access to information and improved user convenience, yet persistent challenges blunt their full impact. Insufficient awareness, limited training, inadequate infrastructure, and recurring technical difficulties are the most commonly reported obstacles. Addressing these barriers is a prerequisite for achieving higher satisfaction and realising the full value of digital library provision.

Objectives

1. To examine how frequently users in autonomous engineering colleges use IT-based library services, and to identify their predominant usage patterns.
2. To measure user satisfaction across specific IT-based services, including OPAC, digital resource collections, and library management software.
3. To assess how effectively the digital infrastructure — internet connectivity, electronic resources, and integrated library systems — supports user needs.
4. To document the main difficulties and barriers users encounter when accessing IT-based library services.

Hypotheses

1. Frequency of IT-based library service use does not differ significantly across UG, PG, and research scholar categories.
2. Perceived ease of access to online resources does not differ significantly between male and female users.
3. User perceptions of OPAC service effectiveness do not differ significantly across respondent groups.
4. There is no significant association between internet infrastructure quality (speed and reliability) and overall user satisfaction.
5. User satisfaction and the challenges faced in IT-based library services are not significantly associated with each other.

METHODOLOGY

A descriptive survey approach with a quantitative orientation was adopted, focusing on user satisfaction and challenges in IT-based library services across autonomous engineering colleges. The study population comprised library service users from selected institutions, totalling 390 individuals. Sample size was calculated using Cochran's formula at a 95% confidence level with a ±5% margin of error, safeguarding the reliability and representativeness of the findings.

Cochran's Formula: $n_0 = Z^2 \cdot p \cdot q / e^2$

This formula produced a minimum required sample of approximately 195 respondents. To strengthen statistical robustness, a larger sample of 345 respondents was deliberately targeted and achieved, judged sufficient for the analytical methods employed. Participants came from 30 autonomous engineering colleges, with roughly 13 respondents per institution. The sampling procedure was designed to include all academic strata — undergraduate, postgraduate, and research scholar categories. Primary data were collected via a purpose-built questionnaire covering usage frequency, satisfaction ratings, infrastructure perceptions, accessibility, and encountered challenges. The instrument comprised closed-ended questions and Likert-scale items calibrated to capture nuanced user perceptions. Data collection took place during the academic year 2025–2026, with questionnaires distributed on-site at the participating institutions. In total, 345 completed responses were retained for analysis. The dataset was processed using MS Excel and SPSS. Descriptive statistics — frequency counts, percentages, mean (M), and standard deviation (SD) — were computed for each variable. Hypothesis testing relied on One-way ANOVA, the Chi-square test, and the F-test, all evaluated at the 0.05 level of significance.

Data Analysis and Interpretation: Usable questionnaires were collected from 345 library users across 30 autonomous engineering colleges (representing a population of 390), with approximately 13 respondents per college — a sample size adequate for rigorous statistical work. Of these, 148 (42.9%) identified as male and 197 (57.1%) as female, reflecting greater female participation. By academic level, undergraduates accounted for the largest segment with 212 respondents (61.4%), postgraduate students contributed 117 (33.9%), and research scholars formed the smallest cohort with 16 respondents (4.6%). The overall distribution across gender and academic levels provides a well-balanced analytical foundation for exploring satisfaction and challenges in IT-based library services. Table 1 maps library visit frequency across the 345-person sample. Usage is high across all three groups, though intensity varies. Overall, 39.13% visit the library daily — the single most common frequency — and a further 36.81% do so three to five times weekly, meaning roughly three-quarters of users access services on a near-daily basis. Among UG students, daily usage stands at 40.09%; the figure for PG students is 35.9%. Research scholars record the highest daily usage rate at 50%, reflecting sustained dependence on library resources for research work. Weekly visits at lower frequency (1–2 times) account for 14.49% of the sample, while monthly (4.93%) and occasional (3.48%) users are a clear minority. Barely 1.16% report only rare engagement, confirming that sustained disengagement is uncommon. Table 2 disaggregates session duration by gender for the 345 respondents. The 1–2 hour bracket is the most common, accounting for 47.83% of responses overall; 50.68% of males and 45.69% of females fall here, indicating male users tend toward slightly longer mid-range sessions. Sessions under an hour represent the second-largest category (42.9%), with females (44.67%) somewhat more likely than males (40.54%) to favour shorter visits — possibly reflecting time pressures or selective resource use. Extended sessions are comparatively rare: 6.38% spend 2–3 hours and just 2.9% remain for more than three hours.

Table 1. Usage Frequency of IT-Based Library Services

Frequency	UG	%	PG	%	Research Scholar	%	Total	%
Daily	85	40.09	42	35.9	8	50	135	39.13
3–5 times a week	78	36.79	45	38.46	4	25	127	36.81
1–2 times a week	30	14.15	18	15.38	2	12.5	50	14.49
Monthly	10	4.72	6	5.13	1	6.25	17	4.93
Occasionally	7	3.3	4	3.42	1	6.25	12	3.48
Rarely	2	0.94	2	1.71	0	0	4	1.16
Total	212	100	117	100	16	100	345	100

Table 2. Duration of Single Library Session by Gender

Time	Male	%	Female	%	Total	%
Less than an hour	60	40.54	88	44.67	148	42.9
1–2 hours	75	50.68	90	45.69	165	47.83
2–3 hours	8	5.41	14	7.11	22	6.38
More than 3 hours	5	3.38	5	2.54	10	2.9
Total	148	100	197	100	345	100

Table 3.Gender-wise Ease of Access to Online Resources

Variables	Male (M)	SD	Female (M)	SD	F Value	Sig.
E-journals	3.85	0.91	3.98	0.86	1.728	0.19
E-books	3.78	0.95	3.88	0.90	1.102	0.295
Databases	3.70	0.98	3.80	0.92	0.964	0.327
Institutional Repository	3.60	1.02	3.68	0.97	0.546	0.46
Remote Access Services	3.75	0.96	3.85	0.91	1.215	0.271
Digital Library Portal	3.82	0.93	3.92	0.88	1.084	0.298

Table4.*Perceived Effectiveness of OPAC / Digital Catalogue*

Variables	Always	%	Often	%	Sometimes	%	Rarely	%	Never	%	Chi-sq	Sig.
Ease of searching library materials	100	28.99	125	36.23	70	20.29	33	9.57	17	4.93	2.18	0.702
Accuracy of search results	93	26.96	120	34.78	74	21.45	36	10.43	22	6.38	1.95	0.745
Speed of OPAC system	85	24.64	115	33.33	80	23.19	40	11.59	25	7.25	2.36	0.67
User-friendly interface	93	26.96	124	35.94	70	20.29	36	10.43	22	6.38	1.88	0.758
Up-to-date information availability	88	25.51	118	34.20	76	22.03	40	11.59	23	6.67	2.04	0.728
Overall effectiveness of OPAC	98	28.41	128	37.10	68	19.71	32	9.28	19	5.51	2.12	0.713

Table5.*Assessment of Internet Speed and Reliability*

Variables	Always	%	Often	%	Sometimes	%	Rarely	%	Never	%	M	SD
Internet speed is satisfactory	90	26.09	120	34.78	70	20.29	40	11.59	25	7.25	3.76	1.09
Internet connectivity is reliable	85	24.64	115	33.33	80	23.19	40	11.59	25	7.25	3.69	1.08
Wi-Fi availability in the library	95	27.54	125	36.23	65	18.84	35	10.14	25	7.25	3.84	1.06
Speed of accessing e-resources	88	25.51	118	34.20	75	21.74	39	11.30	25	7.25	3.73	1.09
Stability of digital library tools	80	23.19	110	31.88	85	24.64	45	13.04	25	7.25	3.61	1.10
Overall internet and system performance	85	24.64	120	34.78	78	22.61	37	10.72	25	7.25	3.70	1.08

Table 3 compares male and female responses on perceived ease of access across six digital resource types. Mean scores exceed 3.50 for both groups, indicating broadly positive access experiences. E-journals record the highest means (3.85 for males, 3.98 for females), confirming them as the most accessible and heavily used online resource type. Institutional repositories score comparatively lower (Male M = 3.60, Female M = 3.68), suggesting slightly more friction in access. Female respondents return marginally higher means across every variable, hinting at somewhat better perceived accessibility. All F-values are non-significant ($p > 0.05$), confirming that gender is not a meaningful differentiator in online resource access. Table 4 captures respondent views on six dimensions of OPAC performance: search ease, result accuracy, system speed, interface design, currency of information, and overall utility. Across all six items, the majority selected "Always" or "Often," confirming OPAC as a broadly functional and reliable access tool. Ease of searching attracted the strongest positive endorsement — users find the catalogue straightforward to operate. Result accuracy and interface design also drew favourable ratings. System speed and information currency scored slightly lower, though "Often" remained predominant, pointing to acceptable rather than exceptional performance. Chi-square values are uniformly low and significance levels exceed 0.05 across all variables, confirming no meaningful differences between respondent subgroups in their OPAC assessments. Table 5 reports user evaluations of six internet-related dimensions. Most responses cluster in the "Always" and "Often" categories, indicating general satisfaction with network services. Wi-Fi availability in the library earns the highest positive rating (27.54% "Always," 36.23% "Often"), suggesting that physical network coverage within library premises is reasonably well managed. Digital library tool stability (M = 3.61) and connection reliability (M = 3.69) score somewhat lower, indicating that intermittent service disruptions do occur. Even for these lower-scoring variables, however, responses remain predominantly positive, suggesting such interruptions are not severe enough to fundamentally undermine the user experience. Table 6 documents user perceptions of software usability across six aspects. Responses concentrate heavily in the "Always" and "Often" bands, indicating library software is broadly perceived as accessible. Ease of use records the highest approval (28.99% "Always" and 39.13% "Often"), and both the login process (M = 3.76) and OPAC navigation (M = 3.74) return strong mean scores. System response speed (M = 3.68) is the lowest-rated variable, suggesting a subset of users experiences lag; nonetheless, responses for this item also predominantly skew positive. The composite software usability score (M = 3.75) confirms an overall favourable impression of the library software environment.

Table 6. ***User-Friendliness of Library Software***

Variables	Always	%	Often	%	Sometimes	%	Rarely	%	Never	%	M	SD
Ease of using library software	100	28.99	135	39.13	60	17.39	30	8.70	20	5.80	3.78	1.06
Simple navigation of OPAC system	95	27.54	130	37.68	70	20.29	30	8.70	20	5.80	3.74	1.07
Easy login and access process	105	30.43	125	36.23	60	17.39	35	10.14	20	5.80	3.76	1.09
System response speed	90	26.09	120	34.78	75	21.74	40	11.59	20	5.80	3.68	1.10
Clarity of instructions and interface	92	26.67	128	37.10	70	20.29	35	10.14	20	5.80	3.72	1.08
Overall user-friendliness of software	98	28.41	130	37.68	65	18.84	32	9.28	20	5.80	3.75	1.07

Table 7. ***Helpfulness of Library Staff in Digital Service Delivery***

Variables	Always	%	Often	%	Sometimes	%	Rarely	%	Never	%	M	SD
Staff guidance in using digital services	120	34.78	140	40.58	45	13.04	25	7.25	15	4.35	3.95	1.02
Support in accessing e-resources	115	33.33	138	40.00	50	14.49	27	7.83	15	4.35	3.92	1.03
Help in OPAC/search system usage	118	34.20	135	39.13	52	15.07	25	7.25	15	4.35	3.93	1.04
Response to user queries	122	35.36	140	40.58	45	13.04	23	6.67	15	4.35	3.97	1.01
Assistance in troubleshooting IT issues	110	31.88	138	40.00	55	15.94	27	7.83	15	4.35	3.88	1.05
Overall helpfulness of library staff	118	34.20	138	40.00	49	14.20	25	7.25	15	4.35	3.93	1.03

Table 8. Overall Satisfaction with Digital Facilities

Variables	Always	%	Often	%	Sometimes	%	Rarely	%	Never	%	M	SD
Digital reading spaces	120	34.78	110	31.88	60	17.39	35	10.14	20	5.80	3.80	1.05
Remote access services	100	28.99	105	30.43	70	20.29	40	11.59	30	8.70	3.59	1.15
Scanning/printing facilities	90	26.09	95	27.54	80	23.19	50	14.49	30	8.70	3.48	1.20
Digital library services overall	130	37.68	120	34.78	60	17.39	20	5.80	15	4.35	3.96	0.95
Ease of remote access	125	36.23	115	33.33	60	17.39	25	7.25	20	5.80	3.87	1.00

Table 9. Problems and Challenges in IT-Based Library Services

Variables	Always	%	Often	%	Sometimes	%	Rarely	%	Never	%	M	SD
Slow internet connectivity	110	31.88	105	30.43	70	20.29	40	11.59	20	5.80	3.71	1.10
Lack of technical skills among users	90	26.09	100	28.99	80	23.19	50	14.49	25	7.25	3.52	1.18
Insufficient digital resources	95	27.54	105	30.43	75	21.74	40	11.59	30	8.70	3.57	1.15
Frequent system downtime	100	28.99	110	31.88	65	18.84	40	11.59	30	8.70	3.60	1.14
Lack of training/support from library staff	85	24.64	95	27.54	85	24.64	50	14.49	30	8.70	3.45	1.20

Table 7 records user perceptions of how effectively library staff support them across six service interactions. Responses lean strongly positive for every item. Query handling earns the most favourable rating (35.36% "Always," 40.58% "Often"; M = 3.97), demonstrating that staff responsiveness to user questions is perceived as particularly strong. Digital guidance (M = 3.95) and OPAC assistance (M = 3.93) also return high scores. IT troubleshooting, at M = 3.88, registers the lowest mean but still clearly positive overall impression. The aggregate helpfulness rating (M = 3.93) reflects a sustained high level of user confidence in library staff across all service dimensions. Table 8 measures satisfaction with five aspects of the broader digital facility offer. Digital library services overall achieves the highest rating (37.68% "Always," 34.78% "Often"; M = 3.96), with ease of remote access a close second (M = 3.87). Scanning and printing services record the lowest satisfaction of any variable (M = 3.48), with relatively high "Sometimes" (23.19%) and "Rarely" (14.49%) responses indicating that these peripheral output services fall below expectations. Overall, user satisfaction with core digital facilities is solid; supporting services such as printing and remote access require targeted attention. Table 9 documents the frequency and severity of five categories of user-reported challenges. Slow internet connectivity is the most widespread problem (31.88% "Always," 30.43% "Often"; M = 3.71), underlining how central network performance is to user experience. Frequent system downtime ranks second (M = 3.60), confirming platform instability as a recurring concern. Insufficient digital resources follow (M = 3.57), suggesting collection breadth and depth do not fully meet demand. Gaps in users' technical skills are nonetheless notably prevalent (M = 3.52). Lack of training and staff support (M = 3.45) scores lowest, yet 24.64% experience this challenge "Always" and 27.54% "Often" — indicating it warrants serious attention, not dismissal. Infrastructure-related obstacles (connectivity and system reliability) are the dominant constraints; skill and resource deficits are secondary but significant.

DISCUSSION

ICT-based library services have become embedded in academic life, widening information access and reinforcing teaching and research. The data confirm that users across all academic levels engage with digital library services regularly. Undergraduates constitute the single largest user group, while research scholars — though fewer — depend on these services most consistently relative to their group size. E-resources, particularly e-journals, e-books, and integrated digital library portals, rank as the most frequently accessed categories. OPAC usage is also widespread, driven by its intuitive search interface, result accuracy, and straightforward design. Access experiences are broadly positive and do not differ meaningfully along gender lines. Library staff play an especially valued role, offering guidance, handling queries promptly, and enabling users to navigate digital tools they might otherwise find difficult. Software usability is another notable strength. Easy navigation, streamlined login procedures, and clear interface design reduce the cognitive burden on users, and the average session of one to two hours reflects purposeful, focused engagement rather than frustrated searching. That said, important challenges cut across this broadly positive picture. Internet slowdowns, periodic system outages, and platform instability remain recurrent frustrations. Gaps in user-side technical competence and limited awareness of available resources further constrain effective use, while infrastructure shortfalls — particularly inconsistent connectivity — act as a persistent barrier for a subset of users. Core digital services attract the highest satisfaction scores; supporting functions such as scanning, printing, and remote access score noticeably lower, identifying where improvements would have the most visible impact. The study's overall message is that IT-based library services have achieved broad adoption and strong baseline satisfaction, but specific structural limitations continue to cap their effectiveness. Strengthening digital infrastructure and stabilising internet provision are the most pressing technical requirements. Equally, regular, well-structured training programmes are needed to close the competency gap that restricts how fully users can exploit available resources. Library professionals must maintain active engagement with users, while institutions must back that engagement with sustained investment in technology and infrastructure. Coordinated effort across library staff, management, and the user community is the most reliable route toward a library environment

that is efficient, accessible, and fit for contemporary academic demands.

CONCLUSION

This study charts the growing centrality of IT-based library services in autonomous engineering colleges, while acknowledging that access patterns and satisfaction levels differ across user groups. Most respondents rely daily on digital resources — e-journals, OPAC, and online platforms — confirming that these tools are now embedded in everyday academic practice. At the same time, a clear gap persists between availability and optimal use. Users express solid satisfaction with accessibility, software usability, and staff support, but internet connectivity problems, system performance issues, and uneven technical skills erect meaningful barriers. The net picture is one of services that provide genuinely strong academic support, yet whose full potential remains constrained by infrastructural and competence-related challenges. Closing this gap requires investment on multiple fronts: upgrading internet infrastructure, modernising hardware and software platforms, expanding digital collections, and running sustained user education programmes including workshops and orientation sessions. Library professionals must remain active guides, and institutional leadership must treat these investments as long-term commitments rather than one-time interventions. Future research could usefully examine the distinct needs of specific user subgroups and explore the longer-term relationship between IT-based library service quality and academic achievement. The findings reported here provide a concrete, evidence-based platform for practitioners and policymakers seeking to build more accessible, efficient, and user-responsive digital library environments in engineering higher education.

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